THURSDAY, NOVEMBER 20, 1902.

BERZELIUS AND WÖHLER.

Briefwechsel zwischen J. Berzelius und F. Wöhler. Im Auftrage der Konigl. Gesellschaft der Wissenschaften zu Göttingen. Mit einem Commentar von J. von Braun. Herausgegeben von O. Wallach. Two vols. Pp. xxii + 717 and pp. 743. (Leipzig : Wilhelm Engelmann, 1901.) Price *2l.* net.

THE story of the origin of Wöhler's association with Berzelius has been told by Wöhler himself in the *Berichte* of the German Chemical Society in one of the most charming autobiographical sketches which have ever enlivened the formal pages of a scientific periodical. Readers of the *Berichte*—and their number is legion—will recall the picture of the young graduate of twenty-three who, with the ardour of the zealous neophyte, had journeyed from the cloisters at Heidelberg to seek light and leading from the great high priest at Stockholm. How with a beating heart he stood before Berzelius's door and rang the bell. How it was opened by a well-clad, portly, vigorous-looking man—none other than Berzelius himself; and how he was led into the laboratory as in a dream, doubting if he was really in the classical place which was the object of his aspirations.

From that memorable meeting sprang a friendship which ended only with Wöhler's death. Berzelius died in 1848, but to the end of his days Wöhler continued to cherish the most affectionate feeling towards his teacher, exhibiting an almost filial piety in regard to his name and fame. He remained to the last what he was wont to sign himself—" Unveränderlich Ihr Wöhler."

Berzelius was an indefatigable letter-writer, and his correspondents were to be found in every country in which chemistry was cultivated. But to none did he unburden himself as he did to Wöhler. For nearly a quarter of a century—that is from 1824 to 1848—scarcely a month passed without an exchange of letters. Those from Berzelius were carefully preserved by Wöhler, who subsequently presented them, some hundreds in number, to the Swedish Academy of Sciences.

It is this correspondence which forms the subject-matter of the volumes before us. Its publication is due to the action of the Royal Society of Sciences of Göttingen, which has desired thereby to commemorate, in connection with the centenary of his birth, the long and valuable service which Wöhler rendered to that body as its secretary. Wöhler had stipulated that the letters from Berzelius which he deposited with the Swedish Academy should not be published before January 1, 1900. This injunction was, no doubt, expedient in view of the character of the letters. The period over which the correspondence extended was a time of stress and strain, not only in politics, but also in science and especially in the science of chemistry. When it began, the influence of Berzelius in the world of chemistry was supreme. Davy, it is true, still lived, but his intellectual activity was well-nigh spent and he was already showing signs of the obscure malady which occasioned his death in 1829. As the years flowed on, Berzelius was made conscious that his influence was waning—steadily undermined by the leaders of chemical thought in Germany and in France, by Liebig and Dumas and their respective followers, who, continually at war with one another, agreed only in disagreeing with Berzelius.

The secretary of the Swedish Academy was, however, a doughty antagonist; very tenacious of his convictions and somewhat insistent in his expression of them, as the pages of his *Jahresberichte* frequently testify. As might be expected, his letters to Wöhler give even more emphatic expression of his opinions, and when his feud with Liebeg culminated in ān open breach, he is at no pains to conceal his sense of resentment and irritation. It is this circumstance that determined Wöhler to fix the end of the century as the time that the letters should first be made public—a time so remote from the period to which they relate as to render it reasonably certain that no pain would be occasioned by their publication. In this respect Wöhler was true to himself. He hated contention and was always ready to advise the lion to eat sugar, as he once said to Liebig. His own letters abundantly illustrate this disposition. They are delightful in their spontaneity and directness, in their sobriety of statement, their unfailing charity and the quiet, delicate humour by which they are constantly illumined. Berzelius evidently set considerable store by them, and they were preserved with no less care than his own. They were ultimately given by the Baroness Berzelius to the Stockholm Academy, and were by it placed at the disposal of the Göttingen Society. With a few exceptions, Berzelius's letters were written in Swedish, and have been rendered into German for the purpose of this work by Frau Prof. Schering, of Göttingen, the daughter of the Swedish Prof. Malmsten. Those from Wöhler have been arranged for publication by his daughter, Frl. Emilie Wöhler.

To the historian of chemistry, this correspondence is of singular value and interest, inasmuch as it stretches over the period which saw the rise of modern chemical theory. Throughout it are constant references to the ideas and hypotheses which gradually developed into the chemical doctrine of the middle part of the nineteenth century—of the period we associate with the names of Liebig and Wöhler, Magnus, Mitscherlich, Rose and Dumas. In some of the letters, we have accounts of discoveries and inventions which mark epochs, or points of departure, in chemical progress. Thus in one of the letters Wöhler describes in detail Liebig's newly-invented method of organic analysis, with sketches of the potash-bulbs, of the mode of making the india-rubber joints and of the charcoal furnace or chauffer. Berzelius was, as is evident from his reply, greatly impressed with the value and importance of the new method, and his genius for manipulative chemistry was immediately exercised in suggestions which he trusts may be improvements. Wöhler also sent to Stockholm one of the earliest accounts of Will and Varrentrapp's method of determining nitrogen. Indeed, we frequently meet with accounts, occasionally illustrated by rough sketches, of manipulative methods and pieces of apparatus which are nowadays to be met with in all laboratories. We have accounts sometimes from the discoverers themselves of metaphosphoric acid, thoria, hippuric acid, vanadium, tellurium, chloroform, chloral; of the isolation of

aluminium; of the synthesis of urea and the mode of preparation of a host of substances, organic and inorganic, of which the times were fertile. Very interesting and instructive, too, are the references made by the correspondents to the work of their contemporaries. Thus Berzelius keeps Wöhler informed of what Mosander is doing, and of the researches of his pupils Dahlström, Sefström, Mitscherlich, Magnus and Johnston; whilst Wöhler in his turn tells, for example, what he knows of Liebig's work, of the progress of Bunsen's investigation of the fuming liquor of Cadet, or sends short notices of what the Göttingen students, under the stimulus of his direction, are turning out.

Wöhler was an excellent draughtsman. Some of his drawings are as amusing as they are clever. Not less excellent are his verbal sketches, as may be seen in the admirable descriptions he sends Berzelius of his experiences of Paris and of the French chemists of the day—what Berzelius styles "die amüsanten Plaudereien ueber die Babylonischen Chemiker"—Gay-Lussac, Thénard, Dulong, Ampère, Chevreul, Robiquet, Bussy, Boussingault, Dumas, Pelouze. He thus, for example, describes Ampère:—

"Ampère. Ein Original wie es wohl wenige mehr gibt. Ein ziemlich grosser alter Mann, vom Alter etwas gebückt mit dicker hängender Unterlippe, ziemlich zahnlos, mit hervorstehenden, stier blickenden Augen, eine Perrücke, die hier und da den Kahlkopf durchblicken lässt, gekleidet in schwarzem Frack, der sehr alt und abgeschabt ist, und die Wäsche stets braun von Schnupftabak, den er in zwei Dosen mit sich führt. Dessen ungeachtet war mir dieser Mann einer der merkwürdigsten und respectabelsten. Den Neckereien und Witzen, die er von den anderen alten, namentlich von Arago und Thénard, zu erdulden hat, entgegnet er mit einer grossen Gutmüthigkeit und nicht selten mit komischem Witz. Nichts verdriest ihn, und er bleibt stets in demselben guten Humor. Er ist ohne Zweifel einer der tiefsten speculativen Köpfe und scheint eine ungeheuere allgemeine Gelehrsamkeit zu besitzen. Er ist selbst in den neuesten chemischen Entdeckungen ganz im Detail zu Haus."

Equally interesting, and no less characteristic, is his account of Dumas, whom he styles "der fleissigste und geistvollste der jüngeren franz. Chemiker." His description of the "kleiner, magerer Kerl" is too long to quote here, but it caused Berzelius to say in reply, "Ich möchte unendlich gern Dumas Bekanntschaft machen."

Had space permitted, we should have liked to have given a number of extracts in order to illustrate the wealth of information of historical value which is scattered throughout this correspondence. There is not a dull page in the two volumes. At times, indeed, the letters are of the greatest interest, and not unfrequently they are most amusing.

They have been carefully edited, and the commentary and foot-notes supplied by Dr. von Braun serve to elucidate many points which would otherwise be obscure. We congratulate Prof. Wallach on the production of a work which is a striking monument to the genius of two men of whom it may be said, as Liebig said of his own friendship with one of them, that now they are dead and mouldering, the ties which united them in life still hold them together in the memory of men as faithful workers who zealously laboured in the same field, linked together in the closest friendship. T. E. T.

A BIOLOGICAL PHILOSOPHER.

Die organischen Regulationen. Vorbereitungen zu einer Theorie des Lebens. Von Hans Driesch. Pp. xv+228. (Leipzig: Engelmann, 1901.) Price 3*s.* 6*d.* net.

DR. HANS DRIESCH is well known for his experimental contributions to "developmental mechanics" and as a man of strenuous "begriffskritische Thätigkeit." He is the author of a number of essays which give their readers good exercise in intellectual mastication, and the book before us is another hard nut. We are in entire sympathy with his endeavour after an exact criticism of biological categories and with his ideal of a "truly scientific biology" with thought-out and unified formulæ; we suspect there is some justification for his reproach that there is far too little "reines Nachdenken" in the tents of the biologists; and we share his hope that "in the future the naturalist will be more of a philosopher and the philosopher more of a naturalist"; but, to be frank, we wish that the author, who writes much, could see his way to write a little more clearly. We do not, of course, expect a philosophical criticism of biological categories to read like a novel, but we object to a book where the difficulty of individual sentences intermittently inhibits us in our effort to appreciate the general argument. It may be that biologists do not quite realise how much they are losing by not reading Driesch's essays; but does Driesch realise how much he is losing by ignoring the limitations of human faculty and of a busy biologist's leisure? We have to rub up our mathematics to understand Karl Pearson, we have to learn statistical methods, we are reminded that "nemo physiologus nisi psychologus," we have perforce to be palæontological, our attention to chemistry and physics is essential, we are told that some acquaintance with crystallography, mechanics and meteorology will not be amiss, and so on. Thus a book which demands for its due appreciation no small amount of familiarity with philosophical terms and methods comes almost as the last straw to break the back which mis-education has weakened. We remember, however, that Driesch's essay is intended for philosophers as well as for biologists, and we hope that the former will discover a limpid stream in what seems to us a rather turbid flow, broken here and there by luminous rapid rushes.

The work before us is one of a series of "studies" ("Vorbereitungen") for a theory of life. It deals with "organic regulations," *i.e.* with those vital phenomena which may be roughly compared to the action of a safety-valve in a steam-engine—a compensatory action annulling the disturbing factor and restoring equilibrium. It does not, however, include those coordinated locomotor regulations which we call instinctive adjustments, or those which occur after extirpation-experiments on central nerve-organs. The author has abundant material without these. In studying "organic regulations," which he does with abundance of concrete instances, the author has had a two-fold aim—(*a*) that of giving impulse to research by showing in the strong light of his criticism the gaps in the scientific structure, and (*b*) of advancing a step or two towards "a truly scientific biology." This improved biology will have its dominant concepts more thoroughly thought out and more adequately harmonised,